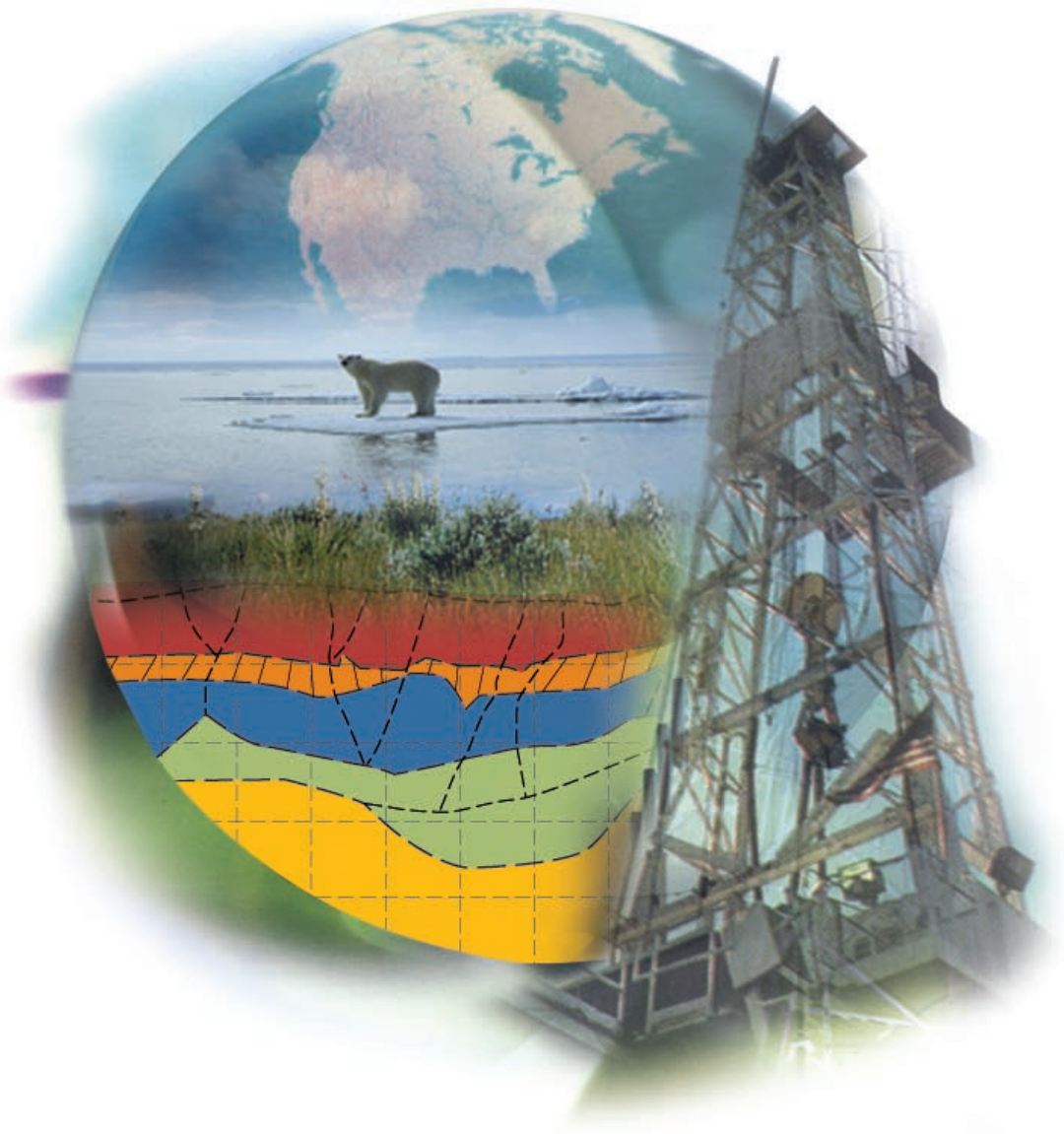
U.S. Department of Energy
Office of Fossil Energy

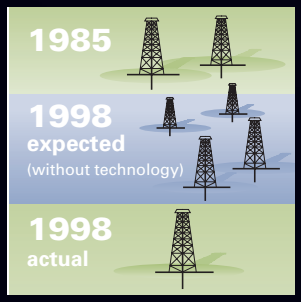


Environmental Benefits of Advanced Oil and Gas Exploration and Production Technology

Environmental Advanced E&P

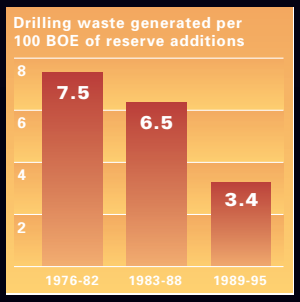
Thanks to advances in exploration and production technology, today's industry is better equipped than ever to find and produce valuable oil and gas—even as these resources become concentrated in deeper, more remote, and more technically challenging areas. Many of the same advances also support our Nation's goals for environmental protection. With each step up in performance and efficiency, the industry can recover more resources with fewer wells drilled, resulting in

- Exploration
- Drilling and Completion
- Production
- Site Restoration
- Operations in Sensitive Environments



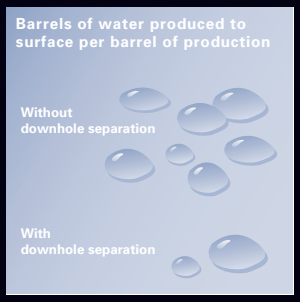
Fewer wells to add same level of reserves

If technology had not advanced since 1985, four domestic wells would have to be drilled today to maintain the production levels achieved by two wells in 1985. But, in fact, technology advances have boosted productivity so successfully that 1985-level production can be achieved today with only one well.



Lower drilling waste volumes

Volumes of drilling muds and drill cuttings per barrel of new oil reserves have steadily declined thanks to improvements in drilling efficiency.

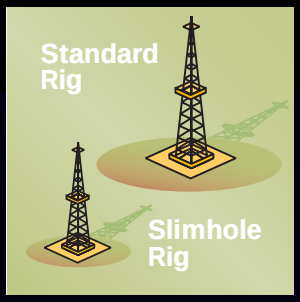


Lower produced water volumes

Emerging downhole separation technology has the potential to dramatically reduce volumes of produced water, which is the largest waste stream associated with oil and gas production.

Benefits of Technology

smaller volumes of cuttings, drilling muds and fluids, and produced waters. Technologies such as slimhole, directional, and multilateral drilling reduce the footprint of drilling rigs and minimize surface impacts. Other benefits of advanced technology include reduced energy consumption, reduced noise from operations, decreased visibility of facilities, reduced emissions of greenhouse gases and hazardous air pollutants, better protection of water resources, preservation of habitats and wildlife, and enhanced worker safety.

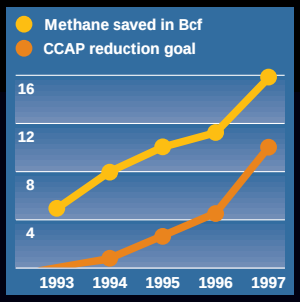


Smaller Footprints

Using modular drilling rigs and slimhole drilling, operators can develop the same volume of resources with a rig up to 75 percent smaller and lighter than a standard rig, reducing impacts on surface environments.

Protection of Sensitive Environments

Directional drilling, slimhole rigs, and other advances enable production of valuable oil and gas resources with less disturbance to wetlands and other sensitive environments.



Reduced Greenhouse Gas Emissions

Through the EPA's voluntary Natural Gas STAR program, the gas industry's use of innovative best management practices has reduced methane emissions by nearly 55 billion cubic feet since 1991, well exceeding the annual goals set by the Climate Change Action Plan. The natural gas production sector alone has accounted for two-thirds of this reduction.

Enhanced Worker Safety

Job-related injuries and illnesses in oil exploration and production are well below the rates in the U.S. manufacturing sector. Advanced drilling, completion, and production technologies have contributed to steady improvements in worker safety, by decreasing workers' time on site and enhancing wellbore control.

Photo: Larry Lee